

In re Patent Application of:  
**ROSSIN ET AL.**  
Serial No. **09/518,421**  
Filed: **March 3, 2000**

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**REMARKS**

Claims 1 to 33 are currently pending. All of claims 1 to 33 have been rejected under 35 U.S.C. 103(a) as being unpatentable over World Patent Application No. 01/48874 (Balsamo) alone or in view of United States Patents Nos. 6,058,128 (Ventrudo) and 6,094,515 (Miki et al).

Declarations under 37 C.F.R. 1.131 from inventors V. Rossin, R. Parke, and J. Major are enclosed attesting to the conception and the reduction to practice of the present invention prior to the United States priority date of January 24, 2000 and prior to the European priority date of December 27, 1999, thereby swearing back of and traversing the Balsamo reference.

As such, it is respectfully submitted that all of the claims remaining in the application are in condition for allowance. Early and favorable consideration would be appreciated.

Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

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Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. **50-1465** and please credit any excess fees to such deposit account.

Respectfully submitted,



CHARLES E. WANDS

Telephone: (321) 725-4760



**27975**

PATENT TRADEMARK OFFICE

In re Patent Application of:  
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**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: ASSISTANT COMMISSIONER OF PATENTS, U.S. PATENT AND TRADEMARK OFFICE, WASHINGTON, D.C. 20231, on this   1   day of July, 2003.

A handwritten signature in cursive script, appearing to read "Kirsten Ferguson", is written over a horizontal line.

#15  
Alper  
7/11/03

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: **Rossin et al** Group Art Unit: **2828**Application Number: **09/518,421** ✓Filed: **March 3, 2000**Examiner: **Rodriguez, A**For: **High Power, Kink-Free, Single Mode Laser Diodes**

## DECLARATION UNDER 37 CFR 1.131

Honorable Commissioner of Patents & Trademarks  
Washington, D.C.  
20231

Sir:

City of San Jose  
State of California,

I, Victor Rossin, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
2. Prior to December 27, 1999, I, along with Jo Major and Ross Parke, conceived the idea of a high power, kink-free, single mode laser diode as described and claimed in our application.
3. On June 22, 1999 a Design Review Meeting was held to finalize the design of the tapered waveguide for use in the laser diode according to the present invention.
4. A disclosure of the invention was prepared and signed by Ross Parke on July 9, 1999, a copy of which is enclosed herewith as Exhibit A.

5. A life test including over 200 laser diodes according to the present invention began October 9, 1999.

6. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, and may jeopardize the validity of the application or any patent issuing therefrom.

Sworn at the city of San Jose in the  
State of California, this eleventh day of  
June, 2003



Victor Rossin



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: **Rossin et al** Group Art Unit: **2828**

Application Number: **09/518,421**

Filed: **March 3, 2000**

Examiner: **Rodriguez, A**

For: **High Power, Kink-Free, Single Mode Laser Diodes**

DECLARATION UNDER 37 CFR 1.131

Honorable Commissioner of Patents & Trademarks  
Washington, D.C.  
20231

Sir:

City of San Jose  
State of California,

I, Ross Parke, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
2. Prior to December 27, 1999, I, along with Jo Major and Victor Rossin, conceived the idea of a high power, kink-free, single mode laser diode as described and claimed in our application.
3. On June 22, 1999 a Design Review Meeting was held to finalize the design of the tapered waveguide for use in the laser diode according to the present invention.
4. A disclosure of the invention was prepared and signed by myself on July 9, 1999, a copy of which is enclosed herewith as Exhibit A.

5. A life test including over 200 laser diodes according to the present invention began October 9, 1999.



6. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, and may jeopardize the validity of the application or any patent issuing there from.

Sworn at the city of San Jose in the  
State of California, this eleventh day of  
June, 2003

  
Ross Parke



## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: **Rossin et al** Group Art Unit: 2828

Application Number: 09/518,421

Filed: **March 3, 2000**Examiner: **Rodriguez, A**For: **High Power, Kink-Free, Single Mode Laser Diodes**

## DECLARATION UNDER 37 CFR 1.131

Honorable Commissioner of Patents & Trademarks  
Washington, D.C.  
20231

Sir:

City of San Jose  
State of California,

I, Jo Major, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
2. Prior to December 27, 1999, I, along with Victor Rossin and Ross Parke, conceived the idea of a high power, kink-free, single mode laser diode as described and claimed in our application.
3. On June 22, 1999 a Design Review Meeting was held to finalize the design of the tapered waveguide for use in the laser diode according to the present invention.
4. A disclosure of the invention was prepared and signed by Ross Parke on July 9, 1999, a copy of which is enclosed herewith as Exhibit A.

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Sworn at the city of San Jose in the  
State of California, this eleventh day of  
June, 2003

  
Jo Major

# Exhibit A

101,088

V. Rossin  
R. Parke

K. Dzurko  
R. Lang  
R. Parke  
D. Mehuys

Distribution:  
D. Scifres  
D. Carothers  
R. Nagarajan  
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To: SDL Patent Operations		
1	Proposal Submitted By (Use Legal Name - First, Middle Last) <b>Victor Rossin</b>	Organization, Building & Extension <b>CBU, bldg.80, 4285</b>
2	Proposal Submitted By (Use Legal Name - First, Middle Last) <b>Ross Parke</b>	Organization, Building & Extension <b>CBU, bldg.80, 4452</b>
*3	Proposal Submitted By (Use Legal Name - First, Middle Last)	Organization, Building & Extension
* If space for additional submitters is required, please use an additional form. Each named submitter must also sign and date each page of the Disclosure.		
Descriptive Title of Invention Disclosure: <b>High-power kink-free single-mode diodes lasers</b>		
Indicate any Program or Product Name and any Expected Date of Sale or Shipment: <b>6540, December 1999</b>		Identify Related IDs and Technical Keywords for Searching: <b>Laser diodes, kink power, single-mode</b>
If This Disclosure is Funded Under a Contract, Provide the Contract Number, Customer Name and Customer Program Name:		
If a Prototype is to be Delivered, Based Upon the Disclosure, Indicate the Expected Date of Sale or Shipment of the Prototype:		
If any Portion of This Disclosure Has Been Previously Published or Presented in an Outside Presentation, Indicate the Date of Disclosure and the Portion Disclosed:		
Names of Others Known to Have Worked on the Same Product or Technology and Citation of Known Published Works: ** M. Sagawa et al, LEOS'96		
** Attach Copies of any papers or patents if submitter(s) already has copies.		
Description of Concept and Embodiments: (The preferred form is to include background information on invention and existing problems, followed by description of the proposed invention with drawings and a discussion as how the new concept improves over present technology. It is permissible to attach copies of materials such as lab notebook pages, memos, drawings, etc. and to refer to such items in the body of the description below, providing all such materials, including this Invention Disclosure, are signed and dated by each named submitter(s) and the witness.)		
<p>It is usual understanding that kink in L-I characteristics of a single-mode laser occurs due to a mixture of a first spatial mode phase-locked with a fundamental optical mode [1]. The threshold for the first spatial mode depends on the width of the waveguide. If the waveguide is sufficiently narrow first spatial mode can be completely eliminated. However, narrowing of the waveguide degrades also the fundamental optical mode increasing its internal losses and decreasing laser slope efficiency. Narrow active region means also higher current density, resulting in non-linear effects such as spectral hole burning which degrades laser performance. It also affects reliability of the laser. The proposed solution to this contradiction is to make a tapered waveguide (see fig.1)</p>		
Witnessed and Understood By: <i>Victor E.</i>		Date: <i>7/9/99</i>
Submitter(s) Signature(s): <i>R. Parke</i>		Date(s): <i>7/9/99</i>

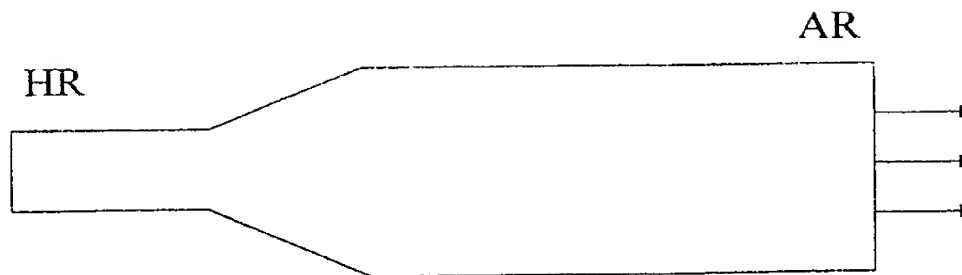


Fig.1. Schematic presentation of tapered waveguide.

The waveguide consists of a narrow part (2-2.5  $\mu\text{m}$  wide) approximately 300  $\mu\text{m}$  in length close to the HR coated facet. The narrow part of the waveguide filters out the first spatial optical mode which is not reflected back. There are some losses for the fundamental optical mode but they are limited due to minimal length of the narrow part of the waveguide. The wide part of the waveguide (4.5-5  $\mu\text{m}$  wide) can be made significantly wider than the typical width of a single-mode waveguide without risk of decrease in kink power. This drastically improves slope efficiency of the fundamental mode and the thermal and electrical characteristics of the chip by decreasing current density and junction temperature at high-power operation. The proposed waveguide design differs from exponential-shaped-flared stripe described in [2]. The latter has widening only near the output facet. The key of our design is to have most of the waveguide wide enough to increase slope efficiency and decrease series and thermal resistances. This design was implemented for current 980-nm single-mode laser development.

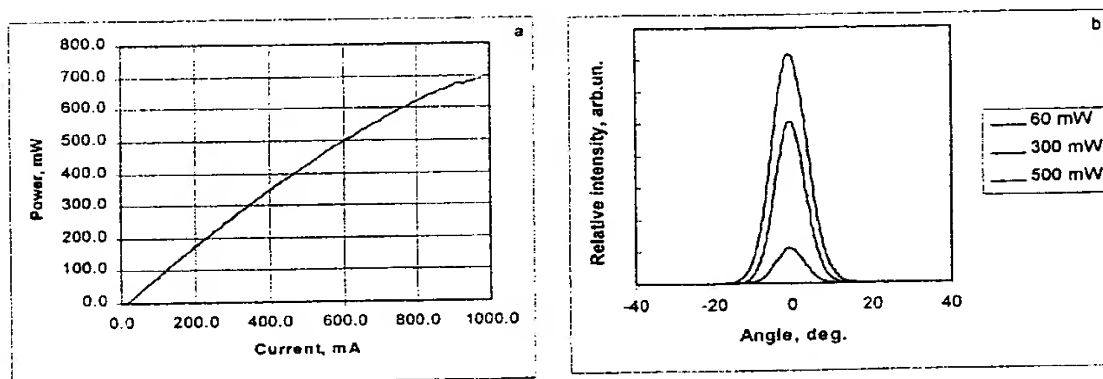


Fig.2. Typical L-I characteristics (a) and parallel far field (b) of the device with tapered waveguide

Witnessed and Understood By: <i>Vadim L.</i>	Date: <i>7.9.99</i>
Submitter(s) Signature(s): <i>R. P.</i>	Date(s): <i>7/9/99</i>

Fig.2 shows typical L-I characteristics and parallel far field of the device. No kink and beam steering can be observed up to power of 600 mW. The results show a dramatic improvement of kink yield. In majority cases no kink is seen in L-I curves.

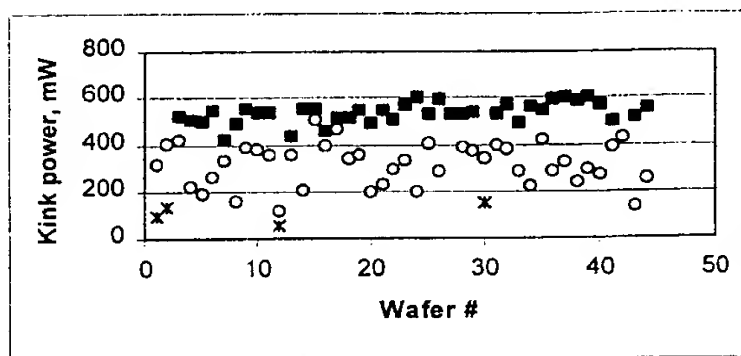


Fig.3 Kink power for different wafers

Fig. 3 demonstrates that devices with tapered waveguide shown with solid squares have significantly higher kink power than the devices with plain rectangular stripes (open circles). Kink power for tapered devices is in the range 500 - 600mW and represents rather the highest power reached at current limit of 800 mA since no kink is observed. Kink for the devices with plain rectangular stripes is real and lies in the range of 200 - 400 mW. It is worth noting that it is vitally important to have HR coating on the narrow side of the chip. If narrow side is AR coated (asterisks on fig.3) kink power drastically drops.

1. M.F. Schemmann, C.J. van der Poel, B.A.H. van Bakel, H.P.M.M. Ambrosius, A. Valster, J.A.M. van den Hejkant, and G.A. Acket, Appl. Phys. Lett., **66**, 920 (1995).

2. M. Sagawa, K. Hiramoto, T. Toyonaka, T. Kikawa and K. Utomi, Proceedings of LEOS'96, Boston, p.42

Witnessed and Understood By: <i>Madim B</i>	Date: <i>7.9.99</i>
Submitter(s) Signature(s): <i>R</i> <i>P</i>	Date(s): <i>7/1/99</i>